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Title: Illinois' reply to Maxwell's Request for Graphics Information, NIC Document 14925.

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Distribution: Network Graphics Group
Craig Maxwell, UCLA-NMC

This is a reply to Craig Maxwell's (UCLA-NMC) "Request for graphics information" of 3/7/73. Further details can be obtained by contacting me directly.

To date, our work in graphics has been primarily centered about support for several applications groups. To make the generation of beam-oriented graphics as painless as possible for these groups, our policy for supporting this type of graphics has been to emulate as closely as possible the CALCOMP plotter support package on the host machine, but with NGPØ output. (Presently, before the resulting NGP can be sent to some of our peripherals, e.g., Gould 4800, it must be converted to device specifics. With the advent of ANTS MARK II and a PDP-11/45, all conversions will be handled locally, so all graphics flowing into our system will be NGP). We find this approach very labor-saving, even at the present slighly kludgey level.

We also have some grey-scale work taking place on our GOULD and IMLAC. One group is processing satellite pictures on Illiac and will soon need grey-scale output, another is producing natural-resource maps, and a third is generating holograms. No standardization plans have been made for grey scale work, but if an acceptable standard is established, we will most likely use it.

A small group, including myself, is currently planning an interactive graphics system. The system will use multiple hosts, possibly using a remote E&S machine for rotation, scaling, etc. We have a number of large hurdles that have to be jumped before we can do anything, though. Several of these are not graphics-specific, such as process-controlled FTP, inter-process coordination among hosts, and others. We had intended to let efficiency dictate the format of intermediate results shipped via the Net, with standardization being applied where it is helpful for minimizing effort. Since the system will be highly interactive and will also manipulate grey-scale data, we will need a higher level of graphics protocol to handle the user interface. A "proto-prototype" system is being used now to do some simple manipulations of meteorological data (e.g., contouring, 3-D plotting) with an IMLAC passively displaying the NGPØ pictures created. Soon, I hope to finish an IMLAC program that will handle some interaction with the mouse/keyset. I have decided to implement the following (out-going) commands.

MOVE beam to mouse position

DRAW from last to present beam position.

TEXT at present beam pos.

UNDO the last command (to facilitate free-hand drawing and backspacing in TEXT).

Other commands may be implemented as needed to do what people want to do, at least until an adequate interaction standard comes along.

Note that there is implicit in the UNDO command the assumption that the other end of the line possesses a certain amount of memory and intelligence. Two possible philosophies for standardizing interaction are that (1) all "nodes" ("generators" or "users" of data) understand some set of commands and possess at least a certain amount of intelligence, and (2) a distinction is made between "displays" and "computers" (quotes because the line is fuzzy). I favor the first for its generality, but I suggest that the lowest level of interactive graphics might want to use the second for ease of implementation with unintelligent devices, e.g., COMPUTEK 400's. (I do not mean to imply in (1) that the actual "computer" would not have a larger vocabulary than the actual "display" --this is inevitable with higher level capabilities in the protocol).

Since we have almost no local computing power for applications work, all our graphics computation is done remotely (our work has been primarily at UCSD (B6700), USC-ISI (TENEX), and UCLA-CCN (360)). Because we do our work at scattered sites and are basically economic of labor (pronounced "lazy"), we have a lot to gain by standards and will be glad to cooperate as much as possible with standardization efforts.

Steve Bunch